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Model Assisted Qualification of NDE Techniques

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The qualification of NDE techniques is currently an expensive and time-consuming process which severely hinders their introduction into service [1]. This is primarily due to the nature of current qualification methodologies which rely upon trials using manufactured or in-service sample defects to demonstrate a sufficient probability of detection (POD) [2]. This process could be significantly improved through the use of experimentally-validated numerical models of inspections which would be able to achieve the same result at a fraction of the cost and time whilst being able to simulate realistic defects. In this work we demonstrate how it is possible to greatly reduce the number of simulations required through sampling and interpolating over the parameter space of possible variations. The result of this process, when combined with the associated probabilities of variations occurring, allows the reliability of an inspection to be quantified. This process yields a wealth of information beyond just a POD curve, allowing inspection methodologies to be optimized during this process as well as demonstrating reliability through a range of metrics including probability of false alarm and the generation of receiver- operator characteristic curves. This procedure will be demonstrated using a simple example of an oblique incidence ultrasonic inspection.

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References:

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